

Cladophlebis, Pterophyllum, and Otozamites are given.

Some form of fossil plant was found by the geologist of the *Discovery* as far south as lat. 78°, but it has been found quite impossible to identify it on account of the imperfect nature of the specimen.

The second part of the book makes some thrilling reading, but adds very little to our knowledge. The attempt of Dr. Andersson, Lieut. Duse and seaman Grunden to reach Nordenskjöld across the ice from the *Antarctic* in the summer of 1902-3, their failure either to reach the winter quarters or to regain the ship, and subsequent lonely winter in Hope Bay, is given in detail. The *Antarctic* foundered on February 12, 1903, as the result of a severe ice "nip," and the crew succeeded in reaching Paulet Island across the ice, where they spent the winter under extremely trying conditions. Fortunately, both Dr. Andersson and Captain Larsen and their parties succeeded in reaching Nordenskjöld's winter quarters in the following summer, and, with the exception of a sailor who died on Paulet Island, all were rescued by the Argentine ship *Uruguay* in November, 1903.

The book consists of about 600 pages, and there are a large number of illustrations, some of which are from crude drawings and are indifferently reproduced. The coloured plates might have been advantageously omitted, as they give no idea of the extreme delicacy and beauty of Antarctic colour. Here and there are slight slips, such, for instance, as appears on p. 119, where the velocity of the wind is given as forty-five miles per second! However, there are no serious blemishes. The field of operations was, geographically, a limited one, and well outside the Antarctic Circle. Scientifically we may look forward to more interesting results. No attempt has been made to give an account of the scientific work, and Dr. Nordenskjöld hints that several years must elapse before the results of the voyage of the *Antarctic* can be published in full.

L. C. B.

A NEW BRITISH MARINE EXPEDITION.

THE hydrographical and biological investigation of the central and western parts of the Indian Ocean will this year be the object of a special cruise of H.M.S. *Sealark*, which is fixed to leave Colombo for the purpose about April 20. This yacht, which is the latest addition to the survey vessels of the Navy, is under the command of Captain Boyle Somerville, who will be accompanied by two scientific civilians, Mr. J. Stanley Gardiner and Mr. C. Forster Cooper.

It will be remembered that the Indian Ocean was not visited by the *Challenger* Expedition in the famous cruise around the world, the course then taken lying further to the south, almost within the Antarctic circle. Meantime, however, knowledge of the region has been steadily increased by the exertions of individual explorers and by special Admiralty surveys. To the east there has been continuous progress, culminating in the Dutch *Siboga* Expedition of 1899-1900 through the East Indies, while other explorers have investigated Keeling Atoll, Christmas Island, and parts of Torres Straits and Western Australia. To the north, the Indian survey vessel *Investigator* has been active from the Persian Gulf almost to the Straits of Malacca, while individual explorers have borne their full share. Prof. Ortmann examined the reefs of Ceylon, and Prof. Herdman is now publishing a full account of the marine fauna and flora of that region. In addition, Mr. Stanley Gardiner, with Messrs. Borradaile and Forster Cooper, devoted sixteen months in 1899-1900 to the

examination of the Laccadives and Maldives, being followed through the same region in 1901 by Prof. Alexander Agassiz, who devoted himself mainly to the coral reefs, with the surface and the deeper pelagic fauna.

The Red Sea and the coast of East Africa is largely a German zone, but to the south a regular systematic investigation of the hydrography and biology is being undertaken by Cape Colony in connection with its sea fisheries. The French have accumulated much knowledge of Madagascar (mainly of the land), while Rodriguez and Mauritius have become fairly well known, to a large extent owing to the Royal Society Expedition of 1874. Of greater importance, however, were the Admiralty surveys of the numerous islands and banks to the north of and around Madagascar, carried out for the most part by Captain (now Admiral Sir Wm.) Wharton. Lastly, the German *Valdivia* Expedition in 1898-9 ran a rapid traverse from St. Paul to Nicobar, Ceylon, Chagos, Seychelles, and up the East African coast. Its work showed the existence of a pelagic fauna at all depths, and of practically the same deep-sea fauna as exists in other oceans. A relatively shallow bank was found between Chagos and the Seychelles, an important discovery which ought to have been followed up by an extended investigation of the region.

The present expedition, organised by Mr. Stanley Gardiner, is an attempt to correlate in some degree the work of all these different expeditions and explorers by a thorough investigation of the oceanography and biology of the region between India and Madagascar, and is the direct outcome of the Maldivian and Laccadive expedition of 1899-1900. As at present proposed, H.M.S. *Sealark*, after leaving Ceylon, will proceed to the Chagos Archipelago, situated to the south of the Maldives in lat. 7° S. This group, for the topography of which we are at present depending almost entirely on a survey made by Captain Moresby in 1837, consists of a series of atolls and submerged banks, of which Great Chagos, an irregular circle upwards of seventy miles in diameter, is the most conspicuous, being the largest existing circular coral reef with a basin in the centre. It is however, perhaps better known through the atoll of Diego Garcia to the south-east, at one time used as a coaling station by the Orient Line between Aden and Australia. That there will be plenty of hydrographical work in the group is quite clear, for there are at present no bottom soundings between any of the banks, and considerable changes may reasonably be expected to have taken place in the last seventy years owing to the growth of the reefs. The expedition will endeavour to fill in these omissions, and while this work is proceeding a close biological and geological survey of the reefs will be undertaken.

From Chagos the *Sealark* will proceed to Mauritius, which should be reached about August 1. Here fresh stores will be taken in, and the collections so far obtained sent home. No extensive work around the island will be possible, but it is hoped to visit some of the reefs. The *Sealark* will then proceed to Cargados, a surface reef to the south of the submerged Nazareth Bank, and the line will be continued along to the Seychelles group over the likewise submerged Saya da Malha Bank. Both these banks may well lie on a crescent of relatively shallow water (less than 1500 fathoms) connecting the Seychelles with Mauritius, but the actual depths should be settled by the expedition. In any case, the examination of these two great submerged banks should throw much-needed light on the formation of

coral reefs. The Agalegas group may also be surveyed, and the nature of its land ascertained. From the Seychelles the *Sealark* will return to Colombo, while the civilian members of the expedition will spend some months in that group and its vicinity, returning home in January, 1906.

The scientific work of the expedition will be of a varied nature. In the first place, the soundings and temperature observations taken by H.M.S. *Sealark* should settle such questions as the existence or non-existence of any relatively shallow banks connecting India and South Africa, and also of any bank from Mauritius to the Seychelles. They should also give an accurate knowledge of the rise and relationships of the various Chagos atolls and banks to one another, and show whether they are really isolated by deep sea or arise on some shallow plateau as do the greater number of the Maldive atolls. Incidentally, also, the soundings may reasonably be expected to indicate what changes, if any, have taken place in the reefs and banks since the last surveys. At the same time it is hoped to examine the currents at various depths, so as to see as far as possible the actual influences at work. In the same connection an investigation has already been commenced on the waters of the Indian Ocean. By the kind assistance of the Meteorological Council, cases of bottles have been sent out to many captains of the British India, P. and O., Orient, Bibby, Clan, and other lines for daily samples of the surface waters, while the expedition itself will obtain samples both from the surface and from various depths during the whole of its sojourn in the Indian Ocean. Mr. D. Matthews, English hydrographer to the North Sea investigation, has undertaken the analyses of these samples, and it is hoped that by continuing the collection for twelve months a more accurate knowledge may be obtained of the movements of the waters of the Indian Ocean. In meteorology a careful log and graphic records will be kept, which, coming from such a little known region, should be useful for comparison with the more regular steamer routes.

In biology, the expedition will everywhere take samples of the bottom and of the pelagic fauna at various depths. The coral reefs will be examined, both surfaces and slopes, while the currents and other factors, possibly influencing the same, will be carefully investigated. The dredges and trawls will be let down as frequently as possible, both to ascertain the general characters of the bottom off the islands and banks, and also to sample the flora and fauna. The deep-sea fauna will not be collected, work being for the most part devoted to intermediate depths (50 to 500 fathoms), within which light tails off into absolute darkness. At the same time, the fauna at lesser depths, both in the Chagos and Seychelles, will be investigated as completely as possible. By these means some clear idea should be obtained of the vertical distributions of both animals and plants, and the comparisons of the marine fauna and flora of the Seychelles and Chagos, together and with those of the surrounding slopes of the Indian Ocean, should at least illuminate the question as to how far the horizontal distribution of such is of value in tracing the former connections of continents and lands. The land flora and fauna can scarcely be expected to be of great interest—it will not at present be attempted in the Seychelles—but it will nevertheless be collected in view of the gradual peopling of oceanic islands.

On the whole, this most recent British exploring expedition may be said to be conceived in the interests, not of one, but of many sciences, and all who sympathise with the advancement of knowledge may be grateful to the Admiralty for detailing a vessel for

such work. The hydrographic results alone should more than justify the dispatch of H.M.S. *Sealark*, while any discovery which may be made of the laws which govern the formation and growth of coral and other reefs—and to which we seem to be tending—would make navigation in tropical waters appreciably safer. The scientific members of the expedition have been required to find all the extra gear and instruments necessary for their work. In this they have been materially assisted by grants from the British Association and from the Balfour memorial fund at Cambridge; but the bulk of the expense has been undertaken by the Trust recently founded by Mrs. Percy Sladen in memory of her late husband—to whom, it is felt, the objects of this expedition would have very closely appealed, and whose name will appropriately appear upon the publications issued as a result of the investigation.

THE INDIAN EARTHQUAKE OF APRIL 4.

A LARGE part of north-western India was severely shaken by an earthquake which occurred on April 4, shortly after six o'clock in the morning, causing the destruction of numerous buildings and the loss of many lives—the number being estimated at twenty thousand. The last great earthquake in India, in June, 1897, was one of the most violent of which there is any historical record, but the casualties and damage due to that disturbance were comparatively small, because the earthquake occurred at five o'clock in the afternoon, when many people were out of doors, and there were no large cities within the area of maximum violence. In the case of the earthquake on April 4, most people were indoors at the time of the shock, and the area of greatest disturbance included, unfortunately, several centres where fairly large towns have grown up, chiefly round the official settlements, cantonments, and sanatoria of the British Government. Dharmsala, Dalhousie, Simla with several neighbouring cantonments, Mussoorie, Dehra Dun, Almora, Ranikhet, and Naini Tal are the chief of these; and the many substantial stone buildings in them have naturally suffered much damage from the earthquake shocks.

The reports so far available show that the earthquake, like that of other great disturbances of the same kind, was of Himalayan origin, the centre being about Dharmsala. Its intensity decreased through the Punjab and the United Provinces, while from Rajputana to the north it decreased rapidly. There appears to have been no wide extension of the disturbance towards Assam or Afghanistan, but information from the west is very imperfect.

The whole area where serious damage is known to have been done is included within a line drawn from Shahpur through Kangra to Jawalamukhi, thence east to Sujampur, and then to Baijnath; but what occurred eastwards of this area is not known.

It is clear from the Viceroy's telegrams that the towns of Dharmsala, Kangra, and Palampur are virtually destroyed, that the loss of life has been very great, and that the full measure of catastrophe, owing to difficulty of communication, cannot be ascertained for some time.

The King has sent to the Viceroy a telegram expressing his "profound concern at the news of the calamity which has befallen Lahore and surrounding district," and a message of sympathy with all who have suffered from the earthquake has been sent by the Prince and Princess of Wales.

No news about the earthquake has been received